Fish Inventories of Mid-Atlantic and Northeast Coastal and Barrier Network Parks within Virginia, Maryland and Pennsylvania
2003 Annual Report

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March, 2004

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2003 Annual Report

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Funding Source: Mid Atlantic Network Inventory Funds and Shenandoah Park Base
Funding Amount for Year: $7,714 from Mid-Atlantic Network; $17,247 from Park Base. Total = $24,961
Account Numbers: 2108-NII and 4846-4000-NZI

Abstract:

During the second year of the Mid-Atlantic Network Park fish species inventory, several sites within each of Fredericksburg and Spotsylvania National Military Park (FRSP), Richmond National Battlefield (RICH), Petersburg National Battlefield (PETE), were either resampled from among those initially sampled during 2002 or were sampled for the first time effectively completing the inventory of fish species within those three parks. This year, the inventory of fish species was expanded to include Valley Forge National Historical Park (VAFO), George Washington Birthplace National Monument (GEWA) and Thomas Stone National Historic Site (THST). The latter two parks are components of the Northeast Coastal and Barrier Network. In addition to wadable sites within all of the parks that were sampled with backpack electrofishing gear, two sites at RICH and one site at PETE required the use of boat mounted electrofishing gear. Boat mounted gear and personnel were generously provided by the Virginia Department of Game and Inland Fisheries (VDGIF). The preliminary fish inventory of Pope's Creek, a large, tidally influenced tributary of the lower Potomac River within George Washington Birthplace involved a cooperative agreement with the U.S. Fish and Wildlife Service (USFWS). A variety of sampling methods were employed at Pope's Creek including boat mounted electrofishing gear, trawls, seines, minnow traps and angling gear. The combined sampling efforts within all parks during 2003 included 32 sites along 16 streams or other aquatic habitats. A total of 59 fish species were identified from among thousands of individual fish captured at all of the sites

combined during 2003. Species diversity within individual parks ranged from 8 at Thomas Stone to 26 at Richmond. At Valley Forge and Fredericksburg, 21 species were encountered. At George Washington Birthplace and Petersburg, 22 species were encountered. The areas within Fredericksburg, Richmond and Petersburg that were either resampled or newly sampled during 2003 resulted in the addition of new species within each park that were not encountered during 2002. As in 2002, species diversity appeared to be most influenced by the number streams or other aquatic areas present within each park, stream size and/or diversity of habitat types within/between streams.

Significant Findings

- Fish species diversity and relative density is fairly high in small to medium sized perennial streams within the upper Coastal Plain and Piedmont physiographic provinces of the Mid-Atlantic states.

- In a general sense, all of the fish species encountered at all sites were native species. The noteworthy exceptions to this are members of the Centrarchid family (sunfish and bass) that have been widely dispersed throughout the continental United States as the result of state sponsored stocking programs and, the fathead minnow population encountered at Valley Forge.

- To date, no listed endangered, threatened or sensitive species have been found within any aquatic system in any of the parks.

Management Recommendations

- The park lands included in this inventory are relatively small in area and do not generally contain or otherwise have control of the headwaters of aquatic systems present. Many if not most streams within these parks will be affected by activities associated with development, agriculture or other disturbances further upstream. Where feasible, park staff should encourage programs and projects that result in improved water quality in areas upstream from the parks.

Introduction/Background

On April 3, 2001, a scoping meeting at Richmond National Battlefield was held to plan inventories of vertebrates and vascular plants in the Mid-Atlantic Network (MAN) parks. The MAN includes eleven national parks, primarily located within Virginia and Pennsylvania, that contain significant natural resources. An additional three Virginia/Maryland parks representing the Northeast Coastal and Barrier Network (NCBN) were also included in this assessment. In a preliminary search of existing inventory information from MAN and NCBN parks within Virginia, many gaps were identified in the status of vertebrate groups and most notably with fish.

Of ten Virginia/Maryland parks from the combined networks only two (Shenandoah National Park and Colonial National Monument) had any known inventory information for fish.

During the late summer of 2002, fish inventory efforts were initiated within five Virginia parks including Booker T. Washington National Monument (BOWA), Appomattox Court House National Historical Park (APCO), FRSP, RICH and PETE. Fish species inventories were completed within APCO and BOWA during 2002 due to the comparatively few streams or aquatic habitats contained within each. While most of the streams or other aquatic systems within the other three parks were sampled during 2002, specific conditions including dry sections of streambed or the presence of large ponds deferred the sampling in such areas until 2003.

In the months prior to the 2003 field season, site assessments were conducted by Shenandoah staff of aquatic habitats present within GEWA and VAFO. Preseason planning efforts also sought to cooperatively involve the use of personnel and equipment from the Virginia Department of Game and Inland Fisheries (VDGIF) to accomplish sampling efforts in large ponds and other aquatic systems within RICH and PETE and from the Pennsylvania Fish and Boat Commission (PFBC) to accomplish sampling in the Schuylkill River within VAFO. Additionally, a cooperative agreement was established with the U.S. Fish and Wildlife Service, Gloucester Fishery Resources Office for assistance with sampling efforts at Pope's Creek within GEWA.

Objectives

- Complete the documentation of 90% of fish species present within each of the MAN and NCBN parks within Virginia, Maryland and Pennsylvania that currently lack those data.

Study Area Descriptions

Valley Forge National Historical Park

The land area comprising Valley Forge National Historical Park is situated within the Northern Piedmont physiographic province in southeastern Pennsylvania. The principal aquatic systems within the park include a three mile section of the Schuylkill River, the lower two miles of Valley Creek including its confluence with the Schuylkill and 12 named tributaries of the two. The Schuylkill River is the largest tributary of the Delaware River, the principal aquatic system comprising the Delaware Drainage that ultimately flows into Delaware Bay. Both the Schuylkill River and Valley Creek flow through heavily developed urban landscapes prior to entering the park. In addition to development associated alterations to water quality and drainage patterns, the watershed in the immediate vicinity of the park (3 miles upstream and 1 mile downstream) contain 38 point and non point sources of industrial/hazardous waste including three superfund sites. Unlike many of the other MAN parks, there has been some systematic sampling for fish within Valley Forge prior to the current effort led by Shenandoah staff. Much if not all of the baseline data is associated with Valley Creek. The Pennsylvania Fish and Boat Commission (PFBC) maintains a long term monitoring transect with emphasis on the brown trout fishery on a section of Valley Creek just upstream of State Route 23.

Sampling efforts associated with the MAN fish species inventory during 2003 included four sites along Valley Creek from the confluence with the Schuylkill upstream to a section adjacent to the park boundary near Lafayette's Quarters. Sampling was also completed within a single site each along Lamb Run, Myers Run and Trout Run, tributaries of the Schuylkill River. Additional sampling within the Schuylkill River was planned in cooperation with the PFBC. Unseasonably high, turbid water flows within the Schuylkill resulting from above average precipitation levels during much of the spring and summer precluded any sampling within the river during 2003. Above average and slightly turbid flows were encountered within Valley Creek, Myers Run and Lamb Run at the time of sampling that created difficult but not insurmountable conditions for backpack electrofishing. Substrates encountered within all of the sites sampled ranged from sand to gravel and cobble primarily with some pockets of silt present in slow moving sections and in backwater areas. Deep muck deposits were encountered within Myers Run near the confluence with the Schuylkill River.

Fredericksburg & Spotsylvania National Military Park

The nine units comprising Fredericksburg and Spotsylvania National Military Park are stratified among portions of the upper Coastal Plain, the Piedmont Lowlands and the Piedmont Foothill physiographic provinces (Jenkins and Burkhead, 1994) in north-central Virginia. The park also stratifies portions of the York and Rappahannock Drainages which are the only two of Virginia's ten major drainages that occur entirely within the state. The resulting diversity of aquatic habitats sampled included sections along Hazel Run, upper Deep Run and Wilderness Run within the Rappahannock Drainage, and upper Lewis Run, an unnamed tributary of the Ni River and a tributary of the Poni River known locally as Lucy's Pond within the York Drainage. In sharp contrast to the extremely low water levels and associated flow rates encountered during 2002, all aquatic systems within central and eastern Virginia were fully charged during the summer of 2003 as the result of above average precipitation levels throughout the spring and summer months. The associated moderate to high flow conditions encountered within every stream posed difficult but not insurmountable challenges to fish sampling efforts. Since most of the streams and other aquatic systems within FRSP were adequately sampled during 2002, sampling efforts during 2003 were focused on a section of Wilderness Run upstream of State Route 3 that was completely dry during 2002. Additionally, a backwater area along a tributary of the Poni River (Lucy's Pond) adjacent to the Jackson Shrine, was sampled for the first time during 2003. Substrates encountered ranged from gravel, sand and clay within Wilderness Run to muck, clay and sand at Lucy's Pond.

Richmond National Battlefield

The eight units comprising Richmond National Battlefield that contain natural habitats all occur within the upper Coastal Plain physiographic province in east-central Virginia and all of the associated aquatic systems are within the James Drainage. As within FRSP, most of the streams and other aquatic sites at RICH were initially sampled during 2002. These included sections of Beaverdam Creek, Boatswain Creek and Bloody Run which are first or second order tributaries of the Chickahominy River, and a section on each of Western Run and Crewes Channel which are second order tributaries of the James River. The low water levels experienced during 2002

facilitated sampling portions of the larger aquatic systems at RICH including Beaverdam Creek and Crewes Channel which would otherwise not have been practicable with backpack electrofishing gear. Sampling efforts during 2003 were focused on more extensive coverage of Beaverdam Creek and Crewes Channel with boat mounted electrofishing gear. Above average precipitation levels had completely refilled the backwater pond at Crewes Channel which greatly facilitated sampling by boat within that system. The high flows encountered at Beaverdam Creek created challenging conditions for both boat and backpack electrofishing gear but the inventories of these remaining sites at RICH were completed during 2003. Substrates encountered ranged from sand to muck at Beaverdam Creek to predominantly muck and clay at Crewes Channel.

Petersburg National Battlefield

The main unit of Petersburg National Battlefield is situated on the upper Coastal Plain very close to the Fall Zone, a geologic zone that distinctly divides the Coastal Plain and Piedmont. Petersburg Battlefield is primarily located along the northeastern side of the City of Petersburg in southeastern Virginia. The two principal streams that flow through the main unit (Harrison Creek and Poor Creek) are first and second order tributaries of the Appomattox River in the James Drainage. Both stream channels are fairly narrow, ranging less than a meter to 3 meters in width. While both streams were initially sampled in 2002 during extreme low flow conditions, Poor Creek was nearly dry with minimal flow in the upper reaches to a few isolated pools in the lower reaches. During 2003, both streams were resampled in addition to initial sampling within a small pond located near the Resource Management Office and at two sites along Hatcher Run on the Five Forks Unit. The Hatcher Run site is dominated by a beaver pond covering approximately four acres. The unit also contains a fairly short reach of the main channel of Hatcher Run on the downstream end of the pond. The Hatcher Run site is unique as a component of the MAN fish species inventory in that it is a tributary of the Nottoway River within the Chowan Drainage which ultimately flows into Albemarle Sound in eastern North Carolina. While above average precipitation levels during 2003 had considerable physical effect along stream channels in the vicinity of the battlefield, near optimal conditions were encountered during the various boat and backpack electrofishing sampling efforts within park waters. Substrates throughout the aquatic systems at PETE range from sand and muck on Harrison Creek to sand and clay on Poor Creek to muck, clay and sand on Harrison Run.

George Washington Birthplace National Monument

George Washington's Birthplace National Monument, a NCBN park, fronts the lower Potomac River within the Coastal Plain of Virginia. The tidally influenced lower Potomac River adjacent to the park is approximately six miles wide, consists primarily of brackish water and contains a diverse mix of fish species more typical of those found within Chesapeake Bay than with freshwater species. Along the eastern boundary, the park fronts and encompasses a portion of Pope's Creek, a fairly prominent and expansive Potomac tributary that ranges from a tidal, brackish water estuary in the vicinity of the river to a freshwater system in its upper reaches. Lower Pope's Creek contains a number of small, saltmarsh islands separated by a network of tidal channels. Great Island, located at the upstream end of the island series, is the only island within the series that contains upland habitat in the form of shrubs and trees. Dancing Marsh, a

tributary of Popes Creek within the park, is fed by a small stream that originates on private land adjacent to the western boundary. Bridges Creek, a much smaller Potomac tributary drains portions of the central and western area of the park. There are also several small freshwater ponds present within the park. Above average precipitation levels that affected the region during 2003 served to refill the small ponds that were dry to nearly dry during 2002 and likely decreased the salinity within the central and upper reaches of Pope's Creek. There were no precipitation related impacts associated with the fish sampling effort. Substrates throughout the varied aquatic systems of the park ranged primarily from firm sand in areas of high water flow to deep deposits of muck in backwater areas and ponds.

Thomas Stone National Historic Site

Thomas Stone National Historic Site, a satellite unit of GEWA, is located within the Coastal Plain of southern Maryland approximately six miles north of the Potomac River. A single stream, Hoghole Run flows along the western boundary of the park to the nearby Port Tobacco River, a first order tributary of the Potomac. The main channel of Hoghole Run is generally less than two meters wide with the exception of several beaver ponds located along the central section of the park boundary. The stream channel flows along a powerline right-of-way which limits the shading that the stream would otherwise receive from the surrounding woodlands. The section of Hoghole Run within and adjacent to the park incorporates several small spring fed tributaries that collectively drain the western side of the park There is also a small ¼ acre pond adjacent to the park's visitor center. The above average precipitation levels of 2003 likely facilitated sampling along Hoghole Run since sections of the stream were likely dry to nearly dry during the summer of 2002. Water levels at the time of sampling were average with little to no turbidity encountered. Substrates encountered along Hoghole Run, ranged from sand and gravel within free flowing sections to silt and muck deposits within the beaver ponds.

Methods

Throughout all of the wadable streams or other aquatic systems within each of the six parks sampled during 2003, qualitative backpack electrofishing techniques were employed as described in the Shenandoah Fisheries Monitoring Protocol (Atkinson 2003). Basically, this involves either one or two electrofishing crews depending on stream width, working upstream in a line abreast formation netting every fish that enters and is affected by the electrical field(s) generated. Qualitative techniques involve a single pass through each section with the electrofishing gear as opposed to three-pass or quantitative techniques more commonly employed for population level monitoring.

Within each stream, sampling was initiated in downstream or boundary locations. Where longer sections of perennial streams were encountered such as Valley Creek and Hoghole Run, several sections of approximately 100m in length were sampled with emphasis on all representative and any unique habitats encountered. Small wadable ponds encountered within, GEWA, THST and PETE were also sampled with backpack electrofishing gear by two crews working the shoreline in opposite directions about the entire perimeter of each pond. The large pond habitats including the pond along Hatcher's Run at PETE and Crewes Channel at RICH were sampled with boat

mounted electrofishing gear. The lower section of Beaverdam Creek within RICH was also sampled by boat. In each case, 14' flat bottom boats modified for electrofishing gear were generously provided by the Virginia Department of Game and Inland Fisheries (VDGIF) for use in the inventory within these parks. In all cases involving boat electrofishing, all navigable sections of the shoreline, channel or pond interior were sampled due to the added mobility of the boats combined with the relative size of the areas sampled.

Sampling within the expansive Pope's Creek estuary at GEWA was initiated through a cooperative agreement with the U.S. Fish and Wildlife Service (USFWS), Gloucester Fishery Resources Office. A variety of sampling gear provided by the USFWS including a 16' electrofishing boat, an otter trawl, a 50' seine and several minnow traps were employed within Pope's Creek in attempt to access and capture as many different fish species as possible. A portion of the Shenandoah crew also employed the use of angling gear near the confluence of Pope's Creek with the Potomac River in an attempt to capture some of the larger more mobile fish species suspected of inhabiting the area.

The saline waters within the middle and lower sections of Pope's Creek rendered all electrofishing attempts ineffective. The broad reaches of lower and middle Pope's Creek were sampled using a boat towed otter trawl. The trawl with an opening approximately 10' across was employed for a total of six sweeps of approximately 10 minutes each. Following each sweep with the trawl, captured fish were emptied into an onboard live well and then sorted and counted by species.

Two linear transects of approximately 20 minutes each within the uppermost reaches of Pope's Creek, were sampled with the boat mounted electrofishing gear. The furthest site upstream was just within the navigable limits of the electrofishing boat. Captured fish were stored in the onboard live well which were then sorted and counted by species upon the conclusion of each transect.

Minnow traps baited with dry dog food were set along an upper section of Dancing Marsh. These were left in place overnight and checked the following morning. The few fish that were caught were also sorted and counted by species.

The shoals between Dancing Marsh and Great Island were sampled with a 50' seine hauled in a single sweep for over 100 meters in water approximately two feet deep. Additional seine hauls were conducted around the western shoreline of Great Island. The island itself was used as a processing site for sorting and counting fish upon the conclusion of each haul.

At all other sampling locations involving backpack or boat electrofishing gear, captured fish were sorted by species and counted on adjacent streambank locations. In addition to the basic species inventory, the count data provides relative densities for each species at the time of sampling. Specimens were collected and preserved from each park as needed to aid in species identifications. All collected fish were initially fixed in formalin for at least 24 hours and then transferred to a 70% ethanol solution for long-term storage. This collection is located with the fish collection from Shenandoah National Park in the Natural Resources building at the

Shenandoah National Park Headquarters. The species and origin of specimens are summarized in Appendix A.

Results

A combined total of 32 sites along 16 streams were sampled during 2003 (Table 1). The total inventory effort at all of the sites, streams and parks combined resulted in a capture of 4,057 individual fish representing 59 species (Table 2). Species diversity and fish numbers encountered within each park were most influenced by the total number of streams and sites sampled or by stream size and the associated diversity of different aquatic habitats represented within each.

Valley Forge National Historical Park

The Schuylkill River and Valley Creek are the largest streams present within any of the MAN parks. What Valley Forge lacks in terms of aquatic system diversity, is made up with the size and extent of stream habitats present within the park. During a three day visit to the park in mid August, 2003, sampling was completed within the principal tributaries of the Schuylkill River that occur within the park including four sites along Valley Creek and one site each along Lamb Run, Myers Run and Trout Run (Table 1). A total of 21 fish species were detected park wide during 2003, most of which were contained within two streams, Valley Creek and Myers Run (Table 3). Both streams have fairly deep channels at their respective confluence with the Schuylkill in contrast to Lamb Run which remains shallow and narrow, generally lacking habitat diversity. The site along Trout Run was located approximately one mile upstream of the Schuylkill just above a concrete lined tunnel complex that routes the stream beneath North Gulph Road and State Route 422. Species diversity ranged from 6 each in Lamb Run and Trout Run to 18 in Valley Creek. The high flow conditions generally encountered throughout the park prompted the inclusion of an additional site along Valley Creek to increase the likelihood of encountering all species present within the system at that time.

The most commonly encountered species at VAFO as determined from the total numbers captured (Table 3) were blacknose dace (*Rhinichthys atratulus*), cutlips minnow (*Exoglossum maxillingua*), white sucker (*Catostomus commersonii*), longnose dace (*Rhinichthys cataractae*), green sunfish (*Lepomis cyanellus*), brown trout (*Salmo trutta*) and tessellated darter (*Etheostoma olmstedi*). Fish species not detected in large numbers included brown bullhead (*Ameiurus nebulosus*), largemouth bass (*Micropterus salmoides*), fathead minnow (*Pimephales promelas*), creek chubsucker (*Erimyzon oblongus*), and redbreast sunfish (*Lepomis auritus*). Greater populations of largemouth bass, redbreast sunfish and brown bullheads likely occur within the Schuylkill River. Fathead minnows are an exotic species species within Pennsylvania, the result of bait bucket releases and/or hatchery escapement. To date, Valley Forge is the only MAN park containing a documented population of spotfin shiners (*Cyprinella spiloptera*). Spotfins are fairly widespread in the upper and middle Mississippi basin and along the Atlantic slope south to the Potomac Drainage but are absent from the Coastal Plain and Piedmont Regions of Virginia south of the Potomac.

Fish within VAFO and particularly Valley Creek had a much higher incidence of lesions and deformities than has otherwise been observed throughout the MAN parks. These affects were most pronounced among brown trout, white sucker and cutlips minnow but were generally present among all species encountered within Valley Creek with the exception of blacknose dace and tessellated darter.

Fredericksburg & Spotsylvania National Military Park

To date Fredericksburg and Spotsylvania contained the greatest number of fish species (34) encountered within any of the MAN parks. The large species count is the result of a number of small to medium sized streams stratified among several physiographic provinces with the distinct division among these occurring on either side of the Fall Zone. During 2002, a total of six sites along five streams (Atkinson 2003) were sampled within FRSP during late summer. The section of Wilderness Run on the upstream side of State Route 3 that ran completely dry during the summer of 2002 was sampled in mid May, 2003 during a short term lull between precipitation events. A total of 15 fish species were recorded from the 2003 sampling site (Table 4, Map 7) which included five species not encountered within Wilderness Run during 2002 including common shiner (*Luxilus cornutus*), rosyside dace (*Clinostomus funduloides*), bluehead chub (*Nocomis leptocephalus*), blacknose dace and longnose dace. These are all highly mobile species within a stream system and are likely populations that survived the 2002 drought in any number of stagnant pools present both upstream and downstream of the dry section during 2002. These five species are all common, wide ranging species that were detected within other aquatic systems at FRSP during 2002. The Lucy's Pond site was also sampled during a temporary break between persistent precipitation in mid June. Nine fish species were detected within the portion of the backwater area and feeder channel that occur within the park boundary. Two species, the common carp (*Cyprinus carpio*), and the flier (*Centrarchus macropterus*), were the most noteworthy additions to the FRSP fish species inventory since they were only encountered within this unit of the park. These two species are otherwise common and widely distributed species. The 7 other fish species detected at the Lucy's Pond site (Table 4) have been documented elsewhere within the park. Bluegill (*Lepomis macrochirus*) dominated the catch from Lucy's Pond.

Richmond National Battlefield

The inventory effort within Richmond Battlefield during 2003 was largely a resampling effort held over from 2002 due to a combination of drought effects and the need for boat mounted electrofishing gear. Of the five sites originally sampled during 2002, the extent and depth of aquatic habitats present within Beaverdam Creek and Crewes Channel required the use of boat mounted gear for adequate coverage. Both systems were sampled by boat during late May, 2003 and an additional, more extensive sampling effort with backpack gear was conducted at Beaverdam Creek during mid June. Flow conditions and associated turbidity were both elevated above seasonal norms during late May which resulted in the delay of additional backpack work until mid June. Although water levels within Crewes Channel had fully recovered from the 2002 drought, only one additional species, the green sunfish, was detected within the system as the result of the resampling effort. Juvenile fliers and golden shiners (*Notemigonus crysoleucas*) dominated the catch at Crewes Channel in 2003 (Table 5).

Beaverdam Creek contains the greatest diversity of fish species within the entire park. This stream consists of a wide and deep cut channel flowing from a forested landscape, through a broad marsh and then back through forest on its relatively short course to its confluence with the Chickahominy River. A total of 26 species combined were recorded from the sum of sampling efforts within this stream in 2002 and 2003. Several additional species were detected in Beaverdam Creek during 2003 that were not encountered in 2002 including mud sunfish (*Acantharchus pomotis*), flier, warmouth (*Lepomis gulosus*), spotted bass (*Micropterus punctulatus*), black crappie (*Pomoxis nigromaculatus*), gizzard shad (*Dorosoma cepedianum*), bluehead chub, tessellated darter and eastern mosquitofish (*Gambusia holbrooki*). The stream also contains three fish species that have not been documented elsewhere within any of the MAN parks including gizzard shad, ironcolor shiners (*Notropis chalybaeus*) and swamp darters (*Etheostoma fusiforme*). While gizzard shad are a very wide ranging and generally very common species, the ironcolor shiner, a Coastal Plain species is uncommon to rare north of the Chowan Drainage within Virginia. The Beaverdam Creek record, first documented in 1976 (Jenkins, 1993), is the only recorded population of ironcolors from the James Drainage to date. Swamp darters also have a fairly wide distribution within the Chowan Drainage. Scattered populations of swamp darters exist within the James Drainage but north of the James within Virginia, these fish are uncommon to rare. Beaverdam Creek also contains one of the few populations of bluehead chub that occur within Virginia's Coastal Plain. These fish are otherwise widely distributed throughout the Piedmont, Blue Ridge and Valley and Ridge provinces, south of the Potomac Drainage within Virginia.

Petersburg National Battlefield

Fish species inventory efforts within Petersburg Battlefield during 2003 included both an initial sampling effort along Hatcher Run at Five Forks and in a small pond located near the Resource Management Office, and a resample effort in streams (Harrison Creek and Poor Creek) originally sampled during 2002. The large beaver pond along Hatcher Run at Five Forks was sampled by boat during late May in cooperation with the VDGIF. While over 60 % of the pond contained dense beds of water lily (genus *Nymphaea*) there were sufficient areas of open water, particularly on the downstream side to accommodate several boat electrofishing transects. The combined boat and backpack electrofishing effort within the park boundary resulted in the capture of 16 fish species (Table 6) including the only record of bowfin (*Amia calva*) documented within any of the MAN parks. The catch from Hatcher Run was dominated by golden shiners (150) and bluegill (81). A number of other species were captured in numbers ranging from 8 to 13 each including flier, largemouth bass, bluespotted sunfish (*Enneacanthus gloriosus*), chain pickerel (*Esox niger*), black crappie, creek chubsucker, warmouth and eastern mosquitofish. The addition of Hatcher Run to the fish inventory effort within PETE, increased the number of species encountered within the park from 8 in 2002 to 22 in 2003.

Fish species diversity and numbers on the main unit of Petersburg Battlefield are limited by the small size and relative simplicity of available habitats within the two streams and small pond present. Harrison Creek and Poor Creek were both resampled during late June, 2003 to account for potential drought effects on species diversity in 2002. Both streams are sufficiently small to have had only moderate flows during a period when most other streams throughout the region were experiencing high flows and associated turbid conditions. Only one additional species was

encountered within each stream from the initial samples during 2002. A single bluegill was captured in Harrison Creek this year and relatively small numbers of blacknose dace were recorded in Poor Creek. While the composition and density of the fish population within Harrison Creek appeared little changed from 2002 to 2003, the fish population encountered within Poor Creek was much sparser than expected during 2003. Fish populations within Poor Creek are likely impacted by urban effects immediately downstream of the park. The most visible of these is the reduction of the stream channel to a concrete lined canal of only an inch or two of water depth and lacking any degree of mid-day shade.

The backpack electrofishing effort at the resource management pond produced a single bluegill. While boat electrofishing would have more effectively sampled the small pond and perhaps produced a larger number of fish, the site is inaccessible for a boat launched operation.

George Washington Birthplace National Monument

An extensive, preliminary fish species inventory of Pope's Creek was conducted through a cooperative agreement with the U.S. Fish and Wildlife Service, Gloucester Fishery Resources Office, the results of which are summarized in Moss and Swihart (2003). The sum of electrofishing, trawling, seining and angling efforts within the various reaches of Pope's Creek (Maps 15 & 16), resulted in a total catch consisting of 19 fish species out of a park wide total of 22 species (Table 7). The mid August sample date was coincident with potentially large numbers of juvenile fish present within the system. The most frequently captured species included white perch (*Morone americana*), bay anchovy (*Anchoa mitchilli*), striped bass (*Morone saxatilis*), mummichog (*Fundulus heteroclitus*), banded killifish (*Fundulus diaphanus*), and in the upper section of the system, common carp. At the other extreme, the total catch produced only a single specimen each of American eel (*Anguilla rostrata*), Atlantic needlefish (*Strongylura marina*), alewife (*Alosa pseudoharengus*), channel catfish (*Ictalurus punctatus*), and summer flounder (*Paralichthys dentatus*). In addition to the species reported in Table 7, at least one ray was observed, probably one of the eagle ray group (family Myliobatidae) based on size, and numbers of gizzard shad were observed but not captured. Additionally, silversides (family Atherinidae) were observed and possibly captured but could not be quantified in the results since the individual that was preserved proved to be a bay anchovy. The consensus from USFWS and NPS personnel, was that this preliminary effort resulted in considerably less than 90 % of fish species present within the system.

One other pond within the park, known locally as Ice Pond produced three additional species in 2003 that were not encountered within Pope's Creek including warmouth, golden shiner and eastern mudminnow (*Umbra pygmaea*). A small number of bluegill and a single pumpkinseed (*Lepomis gibbosus*) were also captured within Ice Pond. An additional small pond located between Digwood and Longwood Swamps (Map 14) was sampled during 2003 but no fish were captured. Resource management staff at GEWA reported that the pond had been completely dry during the summer of 2002.

Thomas Stone National Historic Site

The fish species inventory within Thomas Stone National Historic site was completed on July 10, 2003. A total of 8 species (Table 8) were recorded from three sample sites associated with two aquatic systems, Hoghole Run and the Visitor Center Pond. Two species, blacknose dace and eastern mudminnow were dominant in the catch from the two sample sites along Hoghole Run. Blacknose dace dominated the free flowing section sampled and mudminnows were dominant within the backwater and beaver pond section. Hoghole Run also contained much smaller numbers of American eel, largemouth bass, rosyside dace, creek chub (*Semotilus atromaculatus*), and fallfish (*Semotilus corporalis*). All of the bass, chub and fallfish encountered within Hoghole Run were subadult fish which suggests that the stream is used as a spawning/nursery area by these fish. As these fish species mature into larger size classes, they likely move downstream into the Port Tobacco River. The relatively small size of the section of Hoghole Run associated with the park combined with an absence of habitat diversity are the primary factors limiting fish species diversity within that section of the stream.

The Visitor Center Pond produced one additional species (bluegill) not otherwise encountered within the park in addition to largemouth bass. These fish are most likely the result of a stocking effort since the pond is not otherwise associated with a feeder stream of sufficient size to support any fish population.

Data Management

During the course of the inventory, a MAN parks MS Access XP database was created as a medium for fish species inventory data entry, storage and ultimately distribution to the individual parks. The data were entered and verified according to the data management standards established in Atkinson (2003). Additionally, data collected from Hopewell Furnace National Historic Site by a graduate student at The Pennsylvania State University were entered into the MAN parks database by SHEN staff during 2003. Park specific databases will be released to individual parks simultaneously with the annual report.

Discussion and Management Recommendations

With the exception of some of the Centrarchid species and the fathead minnow population at Valley Forge, the fish encountered within the MAN and NCBC parks sampled during 2003 were native species, none of which are listed or otherwise special category (candidate) species. Of the Centrarchids found in Altlantic Slope drainages within Virginia, Maryland and Pennsylvania, rock bass, white crappie (*Pomoxis annularis*), smallmouth bass, largemouth bass (*Micropterus salmoides*), and green sunfish (*Lepomis cyanellus*), have all been introduced and are therefore outside of their original native range. All are now considered as naturalized species and generally accepted as components of the native fish fauna. Within Virginia, Warmouth (*Lepomis gulosus*) are considered native to the James Drainage but were probably introduced to the York and Rappahannock Drainages (Jenkins and Burkhead, 1994).

Rock bass are considered native to the Tennessee and Big Sandy Drainages within Virginia and to the Ohio Basin within Maryland and Pennsylvania all other populations have likely been introduced. This is also true for populations of largemouth and smallmouth bass. The original native range of the green sunfish included the Tennessee, Big Sandy and New Drainages within Virginia, all other populations having been introduced. Populations of redbreast sunfish, pumpkinseed, bluegill, mud sunfish, bluespotted sunfish, and flier are the original native Centrarchid species within the Atlantic Slope drainages of the mid Atlantic states.

The principal management issues that may impact water quality and/or fish populations within these streams or aquatic systems are potential affects from activities associated with development, agriculture or other disturbances upstream of the parks. Within the MAN parks, this is most pronounced at Valley Forge, where in addition to large scale urban development, there are a number of sources of hazardous waste affecting the watersheds upstream. Most, if not all of the aquatic systems associated with the parks included in the 2003 inventory, originate on private, municipal or other lands upstream of each park or park unit. While it is generally acknowledged that every aquatic system within Atlantic Slope drainages have been somewhat degraded from pre-colonial conditions, the primary challenge will be to limit future degradations in an attempt to preserve and/or restore water quality and associated fish species assemblages. Where feasible, park staff should encourage programs and projects that result in improved water quality in areas upstream of individual parks or park units.

In the event that fish monitoring efforts were ever considered for implementation within any of the parks that were a part of the 2003 inventory, several streams including Myers Run, Trout Run and sections of Valley Creek (VAFO), sections of Wilderness Run (FRSP), Beaverdam Creek (RICH) Harrison Creek and Poor Creek (PETE) and sections of Hoghole Run (THST) would be particularly well suited for fisheries monitoring due to accessibility with electrofishing gear, water depth, firm substrates and the presence of well defined linear habitats and habitat breaks within each system. In contrast, streams or aquatic systems that would be fairly difficult to implement fisheries monitoring in include ponds, marshes, swamps or estuarine systems that have high turbidity, deep cut channels (beyond typical wading depths) and muck, mud or other substrates that would reduce the mobility of a crew and significantly contribute to the turbidity at the site.

In addition to population level monitoring, there is clear justification for fish health and disease components, particularly within urbanized aquatic systems (FRSP, RICH and PETE) and especially at VAFO.

Recommendations for Improving/Altering the Program or Project in Future Years

The fish inventory within MAN and selected NCBC parks is largely complete following the 2003 field season. Tasks remaining for 2004 include revisiting GEWA for sampling lower Bridges Creek and for more intensive sampling within Pope's Creek. In regards to Pope's Creek, two visits are proposed for 2004 including one during late spring and a follow up during late summer. Due in large part to the seasonal use of estuarine systems by fish, the spring visit has the potential to add a number of species to the GEWA inventory that are not present in

detectable numbers by late summer. Conversely, there are likely a number of species present within the lower part of the Pope's Creek Estuary during August that were not detected during the preliminary visit of 2003. Inventory work associated with Pope's Creek will necessarily involve additional cooperative agreements with the USFWS and various sampling options and strategies within the lower part of the system are currently being explored.

At VAFO, the remaining task pending is an extensive boat electrofishing survey of the reach of the Schuylkill River that occurs within the park. The tentative agreement with the PFBC for sampling the Schuylkill that existed but could not be fulfilled during 2003 due to high water levels, will be pursued again during 2004. This effort will not involve SHEN staff other than for scheduling the actual survey.

Due to the drought conditions that existed during the summer of 2002 and the diversity of fish species encountered within Appomattox Court House National Historical Park (APCO) and Booker T. Washington National Monument (BOWA), it would be prudent to resample the large streams (Appomattox River and Gills Creek) within each park during the spring of 2004. Revisits to large streams within FRSP and RICH this year have resulted in the detection of additional fish species within individual streams that were not encountered during the low flow conditions associated with the drought in 2002.

Additionally, streams within Gettysburg National Military Park (GETT) and Eisenhower National Historic Site (EISE) will be included in the MAN parks fish species inventory during the 2004 field season. There are three large and one medium sized stream in terms of width and depth present within the two adjacent parks including Rock Creek and Plum Run (GETT) and, Marsh Creek and Willoughby Run (EISE). The size and complexity of the streams within the two parks will require coordination with the PFBC for additional equipment and personnel.

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Jenkins, R.E., and N.M. Burkhead. 1993. Freshwater fishes of Virginia. American Fisheries Society, Bethesda, Maryland. 1079 pp.

Moss, L and G. Swihart. 2003 A Preliminary Inventory of Fishery Resources in Pope's Creek Estuary; George Washington Birthplace National Monument. Unpubl. Report. U.S. Fish and Wildlife Service, Gloucester Fishery Resources Office, Gloucester, VA 23061. 16 pp.

Tables and Figures

Table 1. Streams Sampled within Four Mid-Atlantic and Two Northeast Coastal and Barrier Network Parks during 2003.

ParkCode	Park	AreaID	AreaName	NumSites
VAFO	Valley Forge National Historical Park	LAMB	Lamb Run	1
VAFO	Valley Forge National Historical Park	MYER	Myers Run	1
VAFO	Valley Forge National Historical Park	TROUT	Trout Run	1
VAFO	Valley Forge National Historical Park	VALLEY	Valley Creek	4
FRSP	Fredericksburg & Spotsylvania National Military Park	LUCY	Lucy's Pond Trib	1
FRSP	Fredericksburg & Spotsylvania National Military Park	WILD	Wilderness Run	1
RICH	Richmond National Battlefield Park	BEAV	Beaverdam Creek	1
RICH	Richmond National Battlefield Park	CREWE	Crewes Channel	1
PETE	Petersburg National Battlefield	HARR	Harrison Creek	1
PETE	Petersburg National Battlefield	RM POND	Res. Management Pond	1
PETE	Petersburg National Battlefield	HATCH	Hatcher Run	2
PETE	Petersburg National Battlefield	POOR	Poor Creek	1
GEWA	George Washington Birthplace National Monument	PONDS	Ponds and Dancing Marsh	2
GEWA	George Washington Birthplace National Monument	POPE	Popes Creek	11
THST	Thomas Stone National Historic Site	HOHR	Hoghole Run	2
THST	Thomas Stone National Historic Site	VCPOND	Visitor Center Pond	1

Table 2. Fish Species Inventory and Capture Totals by Park during 2003

FAMILY	COMMONNAME	LATINNAME	VAFO	FRSP	RICH	PETE	GEWA	THST	Total
Amiidae	Bowfin	Amia calva	0	0	0	3	0	0	3
Anguillidae	Eel, American	Anguilla rostrata	0	2	50	9	1	1	63
Aphredoderidae	Perch, Pirate	Aphredoderus sayanus	0	0	23	2	0	0	25
Belonidae	Needlefish, Atlantic	Strongylura marina	0	0	0	0	1	0	1
Catostomidae	Chubsucker, Creek	Erimyzon oblongus	2	14	39	18	0	0	73
Catostomidae	Sucker, White	Catostomus commersonii	175	7	0	0	0	0	182
Centrarchidae	Bass, Largemouth	Micropterus salmoides	5	3	7	13	0	5	33
Centrarchidae	Bass, Spotted	Micropterus punctulatus	0	0	1	0	0	0	1
Centrarchidae	Bass, Rock	Ambloplites rupestris	30	0	0	0	0	0	30
Centrarchidae	Bass, Smallmouth	Micropterus dolomieui	28	0	0	0	0	0	28
Centrarchidae	Bluegill	Lepomis macrochirus	26	110	116	83	11	9	355
Centrarchidae	Crappie, Black	Pomoxis nigromaculatus	0	1	2	11	0	0	14
Centrarchidae	Flier	Centrarchus macropterus	0	1	108	13	0	0	122
Centrarchidae	Pumpkinseed	Lepomis gibbosus	32	5	39	1	2	0	79
Centrarchidae	Sunfish, Bluespotted	Enneacanthus gloriosus	0	3	50	12	0	0	65
Centrarchidae	Sunfish, Green	Lepomis cyanellus	77	3	1	0	0	0	81
Centrarchidae	Sunfish, Mud	Acantharchus pomotis	0	0	20	2	0	0	22
Centrarchidae	Sunfish, Redbreast	Lepomis auritus	1	3	14	1	0	0	19
Centrarchidae	Warmouth	Lepomis gulosus	0	1	13	8	3	0	25
Clupeidae	Alewife	Alosa pseudoharengus	0	0	0	0	1	0	1
Clupidae	Shad, Gizzard	Dorosoma cepedianum	0	0	6	0	0	0	6
Cyprinidae	Carp, Common	Cyprinus carpio	0	2	0	0	24	0	26
Cyprinidae	Chub, Bluehead	Nocomis leptocephalus	0	7	5	0	0	0	12
Cyprinidae	Chub, Creek	Semotilus atromaculatus	13	0	0	22	0	5	40
Cyprinidae	Dace, Blacknose	Rhinichthys atratulus	304	4	0	147	0	178	633
Cyprinidae	Dace, Longnose	Rhinichthys cataractae	78	1	0	0	0	0	79
Cyprinidae	Dace, Rosyside	Clinostomus funduloides	0	18	0	40	0	3	61
Cyprinidae	Fallfish	Semotilus corporalis	0	0	0	0	0	2	2
Cyprinidae	Minnow, Bluntnose	Pimephales notatus	13	0	0	0	0	0	13
Cyprinidae	Minnow, Cutlips	Exoglossum maxillingua	196	0	0	0	0	0	196
Cyprinidae	Minnow, Fathead	Pimephales promelas	4	0	0	0	0	0	4

Table 2 Continued. Fish Species Inventory and Capture Totals by Park during 2003

FAMILY	COMMONNAME	LATINNAME	VAFO	FRSP	RICH	PETE	GEWA	THST	Total
Cyprinidae	Rosyside dace X Common Shiner	Clinostomus funduloides X Luxilus cornutus	0	1	0	0	0	0	1
Cyprinidae	Shiner, Common	Luxilus cornutus	60	6	0	0	0	0	66
Cyprinidae	Shiner, Golden	Notemigonus crysoleucas	0	4	122	150	3	0	279
Cyprinidae	Shiner, Ironcolor	Notropis chalybaeus	0	0	19	0	0	0	19
Cyprinidae	Shiner, Spotfin	Cyprinella spiloptera	31	0	0	0	0	0	31
Cyprinidae	Shiner, Spottail	Notropis hudsonius	12	0	0	0	0	0	12
Engraulidae	Anchovy, Bay	Anchoa mitchilli	0	0	0	0	78	0	78
Esocidae	Pickeral, Chain	Esox niger	0	1	11	12	1	0	25
Fundulidae	Killifish, Banded	Fundulus diaphanus	0	0	0	0	32	0	32
Fundulidae	Mummichog	Fundulus heteroclitus	0	0	0	0	14	0	14
Ictaluridae	Bullhead, Brown	Ameiurus nebulosus	7	1	0	0	5	0	13
Ictaluridae	Bullhead, Yellow	Ameiurus natalis	0	0	3	0	0	0	3
Ictaluridae	Catfish, Channel	Ictalurus punctatus	0	0	0	0	1	0	1
Ictaluridae	Madtom, Margined	Noturus insignis	0	0	10	0	0	0	10
Moronidae	Bass, Striped	Morone saxatilis	0	0	0	0	18	0	18
Moronidae	Perch, White	Morone americana	0	0	0	0	231	0	231
Paralichthyidae	Flounder, Summer	Paralichthys dentatus	0	0	0	0	1	0	1
Percidae	Darter, Swamp	Etheostoma fusiforme	0	0	12	0	0	0	12
Percidae	Darter, Tessellated	Etheostoma olmstedi	51	0	4	0	0	0	55
Percidae	Perch, Yellow	Perca flavescens	0	0	0	0	3	0	3
Petromyzontidae	Lamprey, Least Brook	Lampetra aepyptera	0	0	12	13	0	0	25
Petromyzontidae	Lamprey, Sea	Petromyzon marinus	0	0	0	1	0	0	1
Poeciliidae	Mosquitofish, Eastern	Gambusia holbrooki	0	0	8	13	0	0	21
Pomatomidae	Bluefish	Pomatomus saltatrix	0	0	0	0	2	0	2
Salmonidae	Trout, Brown	Salmo trutta	63	0	0	0	0	0	63
Sciaenidae	Spot	Leiostomus xanthurus	0	0	0	0	4	0	4
Soleidae	Hogchoker	Trinectes maculatus	0	0	0	0	3	0	3
Umbridae	Mudminnow, Eastern	Umbra pygmaea	0	0	3	1	1	735	740
		Total # Individuals	1208	198	698	575	440	938	4057
		Total # Taxa	21	21	26	22	22	8	59

Table 3. Fish Species Inventory and Capture Totals from Valley Forge National Historical Park in 2003.

COMMONNAME	FAMILY	LATINNAME	LAMB	MYER	TROUT	VALLEY	Total
Catostomidae	Sucker, White	Catostomus commersonii	0	20	3	152	175
Catostomidae	Chubsucker, Creek	Erimyzon oblongus	0	2	0	0	2
Centrarchidae	Bass, Rock	Ambloplites rupestris	1	0	0	29	30
Centrarchidae	Sunfish, Redbreast	Lepomis auritus	1	0	0	0	1
Centrarchidae	Sunfish, Green	Lepomis cyanellus	1	46	1	29	77
Centrarchidae	Pumpkinseed	Lepomis gibbosus	2	24	0	6	32
Centrarchidae	Bluegill	Lepomis macrochirus	0	11	1	14	26
Centrarchidae	Bass, Smallmouth	Micropterus dolomieui	9	17	0	2	28
Centrarchidae	Bass, Largemouth	Micropterus salmoides	0	3	0	2	5
Cyprinidae	Shiner, Spotfin	Cyprinella spiloptera	8	16	0	7	31
Cyprinidae	Minnow, Cutlips	Exoglossum maxillingua	0	0	0	196	196
Cyprinidae	Shiner, Common	Luxilus cornutus	0	10	0	50	60
Cyprinidae	Shiner, Spottail	Notropis hudsonius	0	10	0	2	12
Cyprinidae	Minnow, Bluntnose	Pimephales notatus	0	10	0	3	13
Cyprinidae	Minnow, Fathead	Pimephales promelas	0	2	2	0	4
Cyprinidae	Dace, Blacknose	Rhinichthys atratulus	0	20	17	267	304
Cyprinidae	Dace, Longnose	Rhinichthys cataractae	0	0	0	78	78
Cyprinidae	Chub, Creek	Semotilus atromaculatus	0	5	4	4	13
Ictaluridae	Bullhead, Brown	Ameiurus nebulosus	0	6	0	1	7
Percidae	Darter, Tessellated	Etheostoma olmstedi	0	10	0	41	51
Salmonidae	Trout, Brown	Salmo trutta	0	0	0	63	63
		Total # Individuals	22	212	28	946	1208
		Total # Taxa	6	16	6	18	21

Table 4. Fish Species Inventory and Capture Totals from Fredericksburg and Spotsylvania NMP in 2003.

FAMILY	COMMONNAME	LATINNAME	LUCY	WILD	Total
Anguillidae	Eel, American	Anguilla rostrata	0	2	2
Catostomidae	Sucker, White	Catostomus commersonii	0	7	7
Catostomidae	Chubsucker, Creek	Erimyzon oblongus	0	14	14
Centrarchidae	Flier	Centrarchus macropterus	1	0	1
Centrarchidae	Sunfish, Bluespotted	Enneacanthus gloriosus	3	0	3
Centrarchidae	Sunfish, Redbreast	Lepomis auritus	0	3	3
Centrarchidae	Sunfish, Green	Lepomis cyanellus	0	3	3
Centrarchidae	Pumpkinseed	Lepomis gibbosus	4	1	5
Centrarchidae	Warmouth	Lepomis gulosus	1	0	1
Centrarchidae	Bluegill	Lepomis macrochirus	82	28	110
Centrarchidae	Bass, Largemouth	Micropterus salmoides	1	2	3
Centrarchidae	Crappie, Black	Pomoxis nigromaculatus	1	0	1
Cyprinidae	Dace, Rosyside	Clinostomus funduloides	0	18	18
Cyprinidae	Rosyside dace X Common Shiner	Clinostomus funduloides X Luxilus cornutus	0	1	1
Cyprinidae	Carp, Common	Cyprinus carpio	2	0	2
Cyprinidae	Shiner, Common	Luxilus cornutus	0	6	6
Cyprinidae	Chub, Bluehead	Nocomis leptocephalus	0	7	7
Cyprinidae	Shiner, Golden	Notemigonus crysoleucas	0	4	4
Cyprinidae	Dace, Blacknose	Rhinichthys atratulus	0	4	4
Cyprinidae	Dace, Longnose	Rhinichthys cataractae	0	1	1
Esocidae	Pickeral, Chain	Esox niger	1	0	1
Ictaluridae	Bullhead, Brown	Ameiurus nebulosus	0	1	1
		Total # Individuals	96	102	198
		Total # Taxa	9	15	21

Table 5. Fish Species Inventory and Capture Totals from Richmond National Battlefield in 2003.

FAMILY	COMMONNAME	LATINNAME	BEAV	CREW	Total
Eel, American	Anguillidae	Anguilla rostrata	50	0	50
Perch, Pirate	Aphredoderidae	Aphredoderus sayanus	23	0	23
Chubsucker, Creek	Catostomidae	Erimyzon oblongus	39	0	39
Sunfish, Mud	Centrarchidae	Acantharchus pomotis	20	0	20
Flier	Centrarchidae	Centrarchus macropterus	1	107	108
Sunfish, Bluespotted	Centrarchidae	Enneacanthus gloriosus	50	0	50
Sunfish, Redbreast	Centrarchidae	Lepomis auritus	10	4	14
Sunfish, Green	Centrarchidae	Lepomis cyanellus	0	1	1
Pumpkinseed	Centrarchidae	Lepomis gibbosus	25	14	39
Warmouth	Centrarchidae	Lepomis gulosus	13	0	13
Bluegill	Centrarchidae	Lepomis macrochirus	102	14	116
Bass, Largemouth	Centrarchidae	Micropterus salmoides	6	1	7
Bass, Spotted	Centrarchidae	Micropterus punctulatus	1	0	1
Crappie, Black	Centrarchidae	Pomoxis nigromaculatus	2	0	2
Shad, Gizzard	Clupidae	Dorosoma cepedianum	6	0	6
Chub, Bluehead	Cyprinidae	Nocomis leptocephalus	5	0	5
Shiner, Golden	Cyprinidae	Notemigonus crysoleucas	56	66	122
Shiner, Ironcolor	Cyprinidae	Notropis chalybaeus	19	0	19
Pickeral, Chain	Esocidae	Esox niger	11	0	11
Bullhead, Yellow	Ictaluridae	Ameiurus natalis	3	0	3
Madtom, Margined	Ictaluridae	Noturus insignis	10	0	10
Darter, Swamp	Percidae	Etheostoma fusiforme	12	0	12
Darter, Tessellated	Percidae	Etheostoma olmstedi	4	0	4
Lamprey, Least Brook	Petromyzontidae	Lampetra aepyptera	12	0	12
Mosquitofish, Eastern	Poeciliidae	Gambusia holbrooki	8	0	8
Mudminnow, Eastern	Umbridae	Umbra pygmaea	3	0	3
		Total # Individuals	491	207	698
		Total # Taxa	24	7	25

Table 6. Fish Species Inventory and Capture Totals from Petersburg National Battlefield in 2003.

FAMILY	COMMONNAME	LATINNAME	HARR	RM POND	HATCH	POOR	Total
Amiidae	Bowfin	Amia calva	0	0	3	0	3
Anguillidae	Eel, American	Anguilla rostrata	9	0	0	0	9
Aphredoderidae	Perch, Pirate	Aphredoderus sayanus	0	0	2	0	2
Catostomidae	Chubsucker, Creek	Erimyzon oblongus	10	0	8	0	18
Centrarchidae	Sunfish, Mud	Acantharchus pomotis	0	0	2	0	2
Centrarchidae	Flier	Centrarchus macropterus	0	0	13	0	13
Centrarchidae	Sunfish, Bluespotted	Enneacanthus gloriosus	0	0	12	0	12
Centrarchidae	Sunfish, Redbreast	Lepomis auritus	0	0	1	0	1
Centrarchidae	Pumpkinseed	Lepomis gibbosus	0	0	1	0	1
Centrarchidae	Warmouth	Lepomis gulosus	0	0	8	0	8
Centrarchidae	Bluegill	Lepomis macrochirus	1	1	81	0	83
Centrarchidae	Bass, Largemouth	Micropterus salmoides	0	0	13	0	13
Centrarchidae	Crappie, Black	Pomoxis nigromaculatus	0	0	11	0	11
Cyprinidae	Dace, Rosyside	Clinostomus funduloides	40	0	0	0	40
Cyprinidae	Shiner, Golden	Notemigonus crysoleucas	0	0	150	0	150
Cyprinidae	Dace, Blacknose	Rhinichthys atratulus	118	0	0	29	147
Cyprinidae	Chub, Creek	Semotilus atromaculatus	14	0	0	8	22
Esocidae	Pickeral, Chain	Esox niger	0	0	12	0	12
Petromyzontidae	Lamprey, Least Brook	Lampetra aepyptera	13	0	0	0	13
Petromyzontidae	Lamprey, Sea	Petromyzon marinus	1	0	0	0	1
Poeciliidae	Mosquitofish, Eastern	Gambusia holbrooki	0	0	11	2	13
Umbridae	Mudminnow, Eastern	Umbra pygmaea	0	0	1	0	1
		Total # Individuals	206	1	329	39	575
		Total # Taxa	8	1	16	3	22

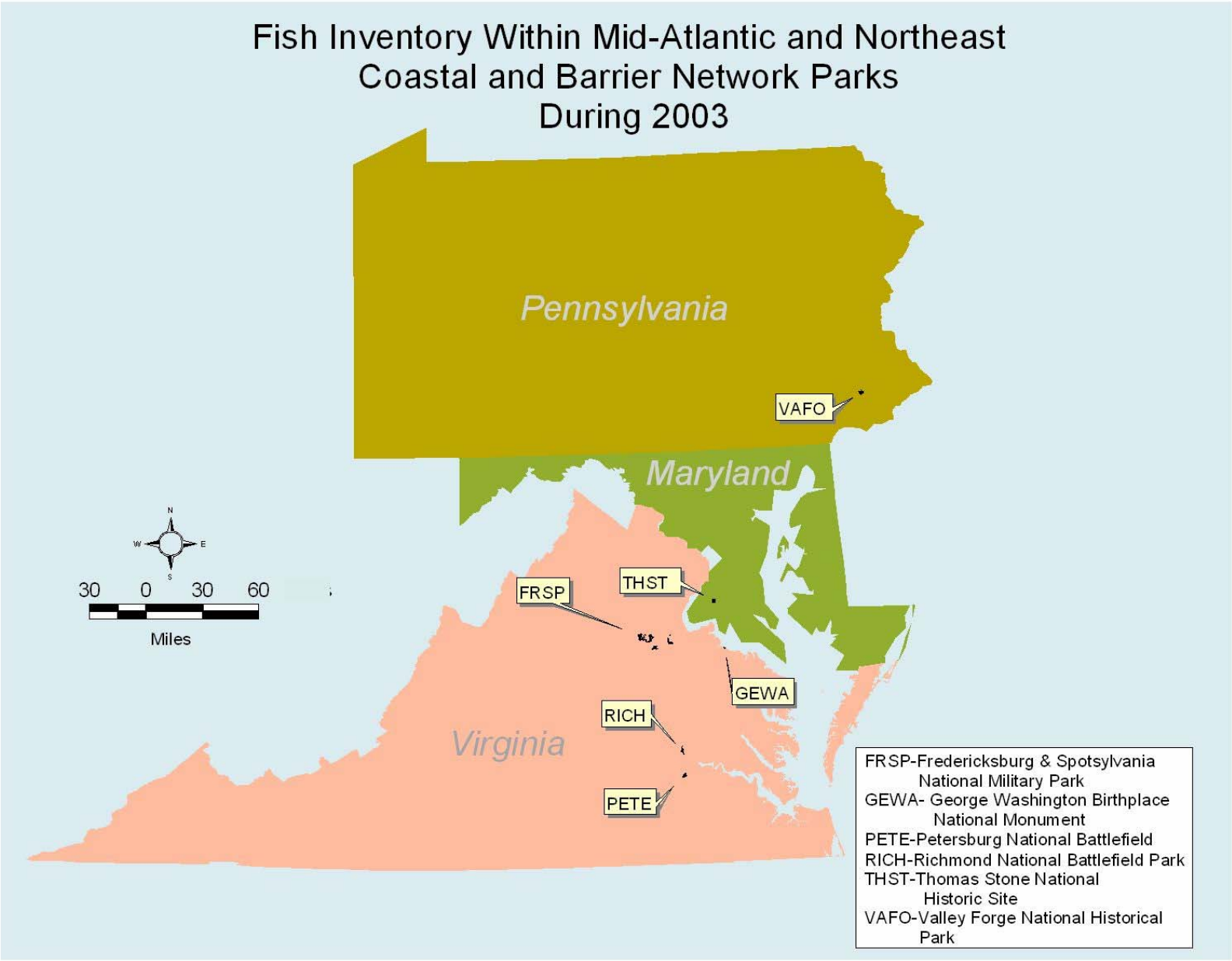
Table 7. Fish Species Inventory and Capture Totals from George Washington Birthplace National Monument in 2003.

FAMILY	COMMONNAME	LATINNAME	PONDS	POPE	Total
Anguillidae	Eel, American	Anguilla rostrata	0	1	1
Belonidae	Needlefish, Atlantic	Strongylura marina	0	1	1
Centrarchidae	Pumpkinseed	Lepomis gibbosus	1	1	2
Centrarchidae	Warmouth	Lepomis gulosus	3	0	3
Centrarchidae	Bluegill	Lepomis macrochirus	6	5	11
Clupeidae	Alewife	Alosa pseudoharengus	0	1	1
Cyprinidae	Carp, Common	Cyprinus carpio	0	24	24
Cyprinidae	Shiner, Golden	Notemigonus crysoleucas	3	0	3
Engraulidae	Anchovy, Bay	Anchoa mitchilli	0	78	78
Esocidae	Pickeral, Chain	Esox niger	0	1	1
Fundulidae	Killifish, Banded	Fundulus diaphanus	22	10	32
Fundulidae	Mummichog	Fundulus heteroclitus	0	14	14
Ictaluridae	Bullhead, Brown	Ameiurus nebulosus	0	5	5
Ictaluridae	Catfish, Channel	Ictalurus punctatus	0	1	1
Moronidae	Perch, White	Morone americana	0	231	231
Moronidae	Bass, Striped	Morone saxatilis	0	18	18
Paralichthyidae	Flounder, Summer	Paralichthys dentatus	0	1	1
Percidae	Perch, Yellow	Perca flavescens	0	3	3
Pomatomidae	Bluefish	Pomatomus saltatrix	0	2	2
Sciaenidae	Spot	Leiostomus xanthurus	0	4	4
Soleidae	Hogchoker	Trinectes maculatus	0	3	3
Umbridae	Mudminnow, Eastern	Umbra pygmaea	1	0	1
		Total # Individuals	36	404	440
		Total # Taxa	5	19	22

Table 8. Fish Species Inventory and Capture Totals from Thomas Stone National Historic Site in 2003.

FAMILY	COMMONNAME	LATINNAME	HOHR	VCPOND	Total
Anguillidae	Eel, American	Anguilla rostrata	1	0	1
Centrarchidae	Bluegill	Lepomis macrochirus	0	9	9
Centrarchidae	Bass, Largemouth	Micropterus salmoides	3	2	5
Cyprinidae	Dace, Rosyside	Clinostomus funduloides	3	0	3
Cyprinidae	Dace, Blacknose	Rhinichthys atratulus	178	0	178
Cyprinidae	Chub, Creek	Semotilus atromaculatus	5	0	5
Cyprinidae	Fallfish	Semotilus corporalis	2	0	2
Umbridae	Mudminnow, Eastern	Umbra pygmaea	735	0	735
		Total # Individuals	927	11	938
		Total # Taxa	7	2	8

Maps


Fish Inventory Within Mid-Atlantic and Northeast
Coastal and Barrier Network Parks
During 2003
Pennsylvania
Maryland
Virginia
VAFO
THST
FRSP
GEWA
RICH
PETE
N
W
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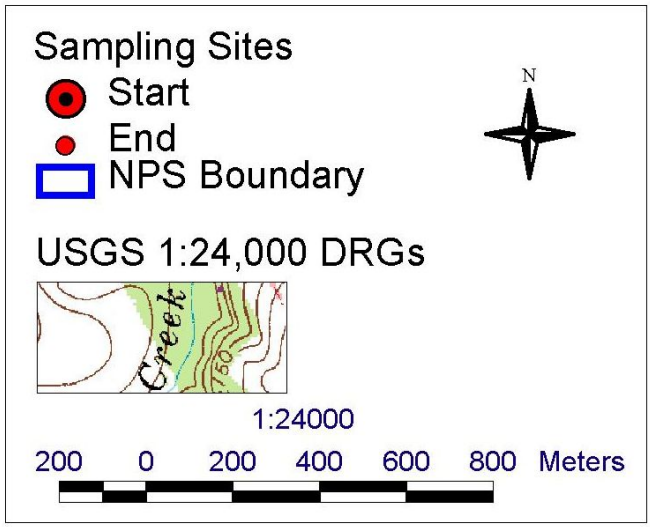
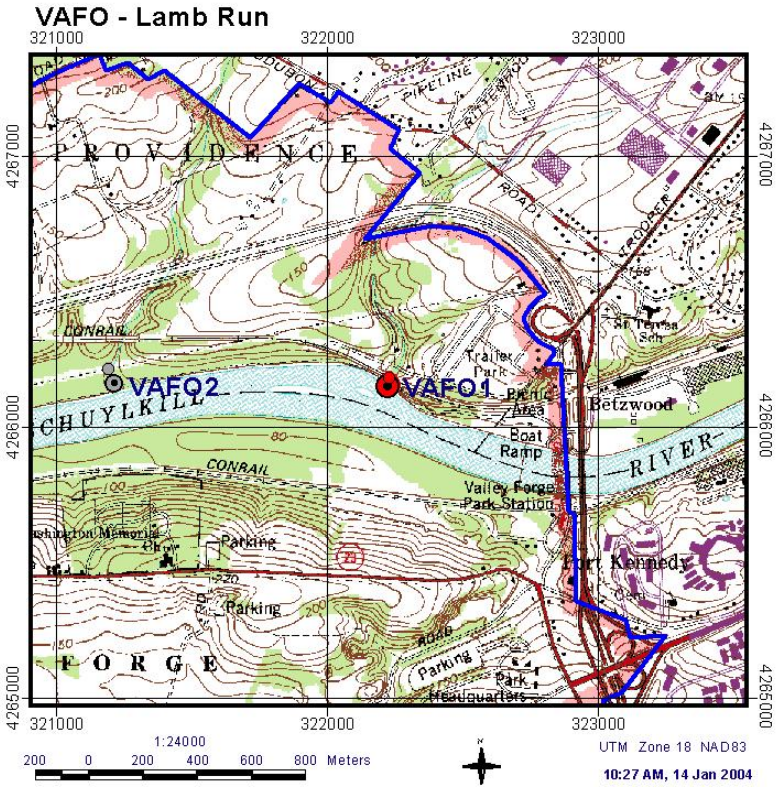
S
30 0 30 60
Miles
FRSP-Fredericksburg & Spotsylvania National Military Park
GEWA- George Washington Birthplace National Monument
PETE-Petersburg National Battlefield
RICH-Richmond National Battlefield Park
THST-Thomas Stone National Historic Site
VAFO-Valley Forge National Historical Park

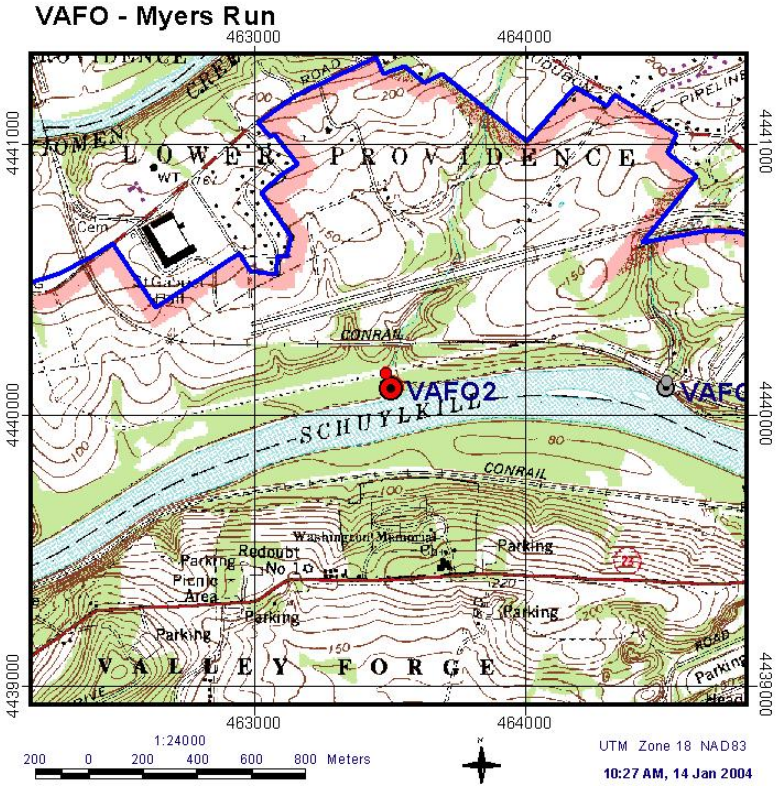
Maps


Sampling Sites
Start
End
NPS Boundary
N
USGS 1:24,000 DRGs
Creek
1:24000
200 0 200 400 600 800 Meters

Map 1: Park: Valley Forge National Historical Park



Map 2: Park: Valley Forge National Historical Park



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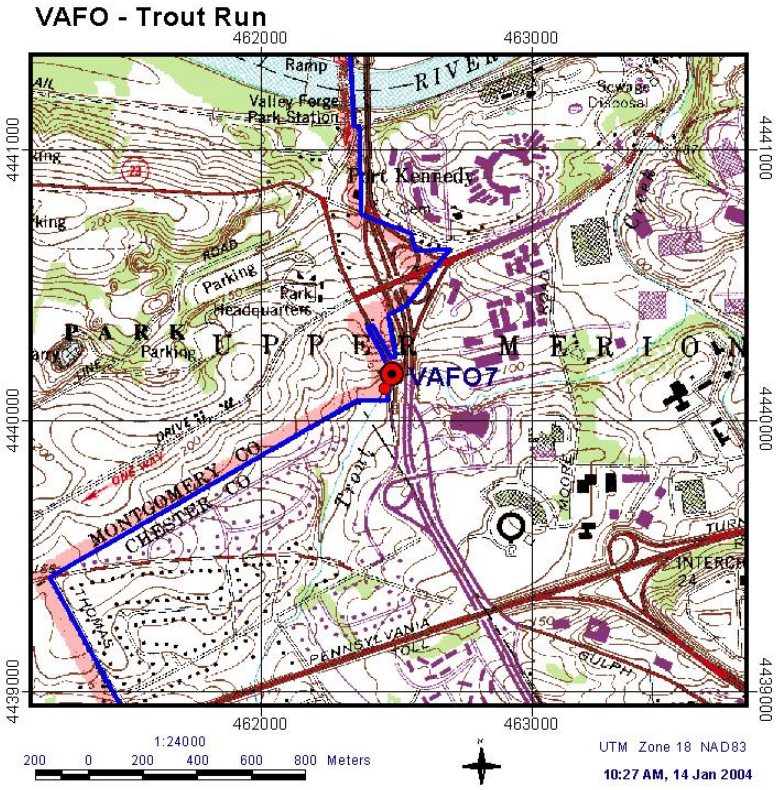

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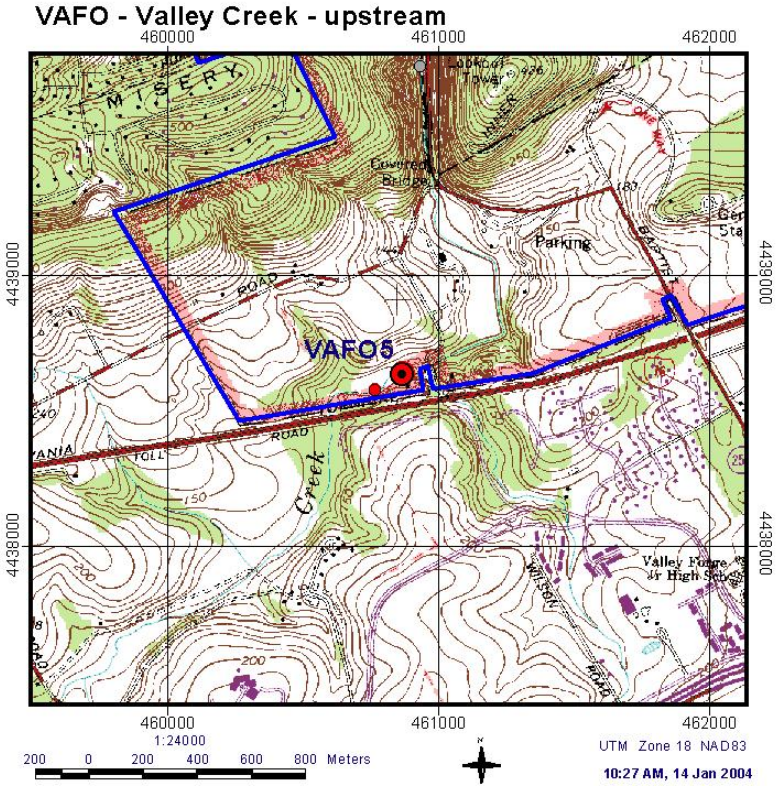

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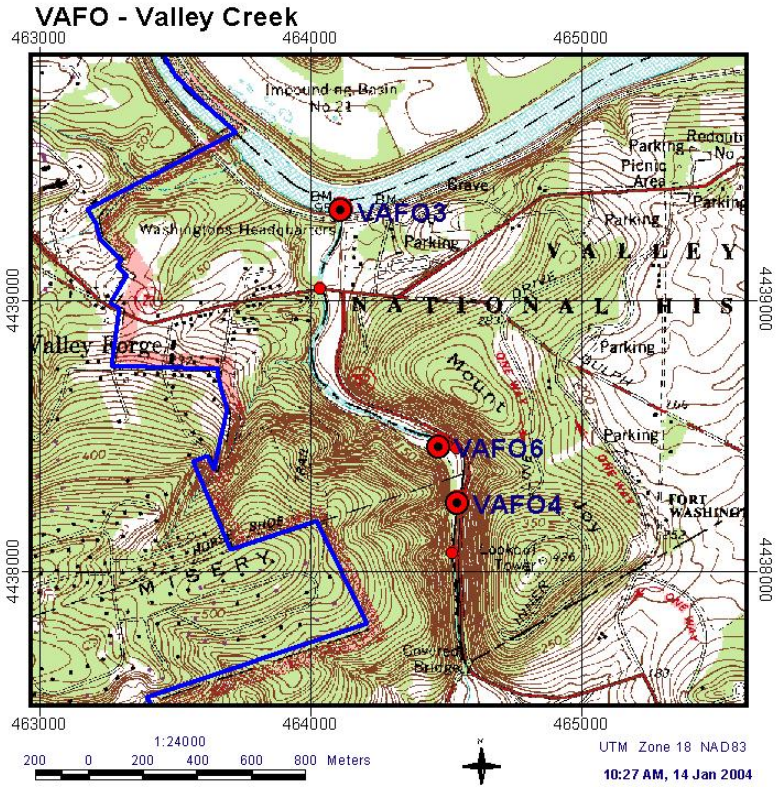
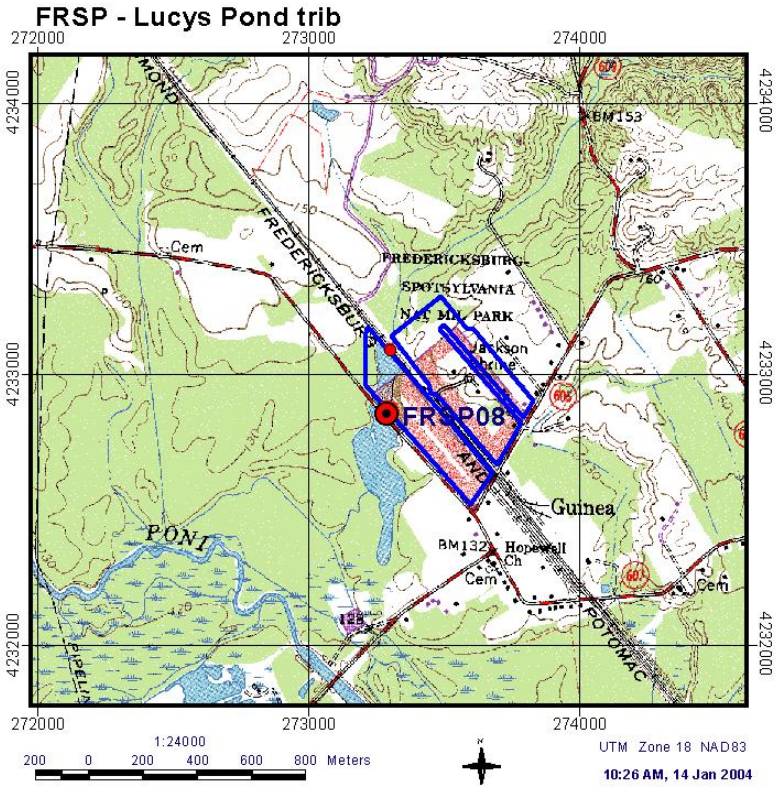
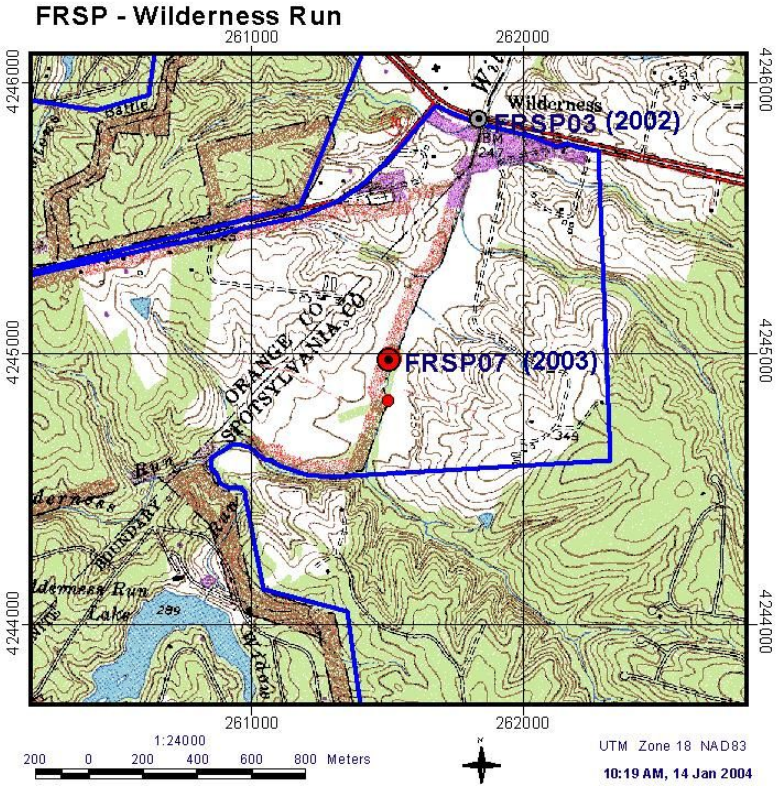


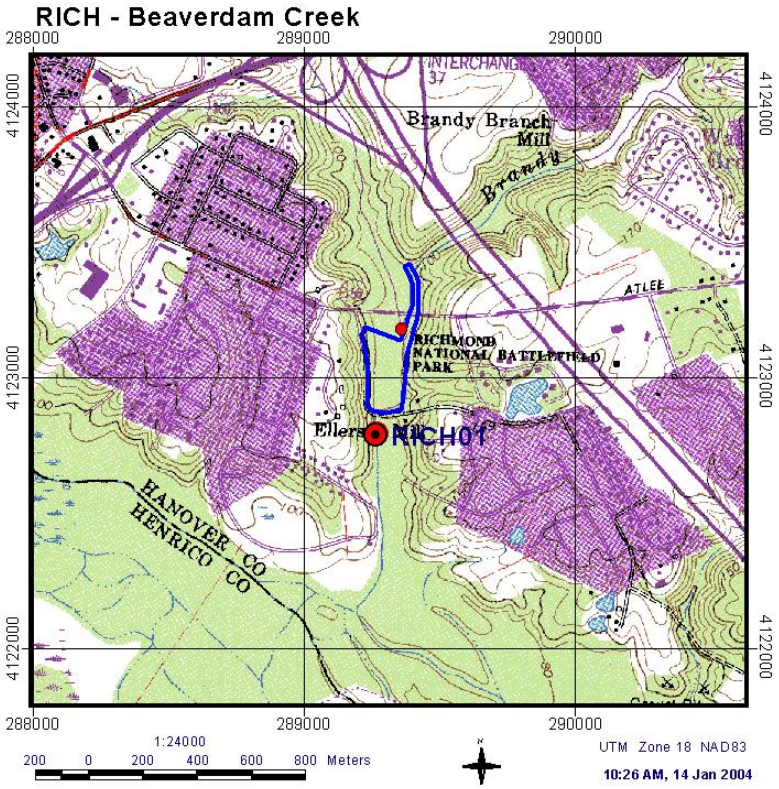
Map 6: Park: Fredericksburg & Spotsylvania National Military Park



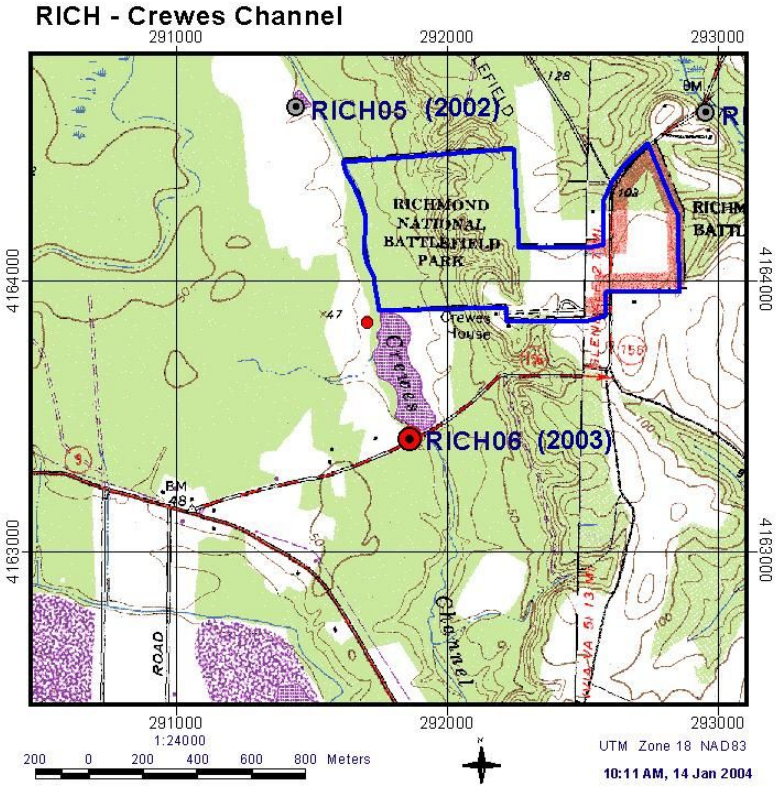
Map 7: Park: Fredericksburg & Spotsylvania National Military Park



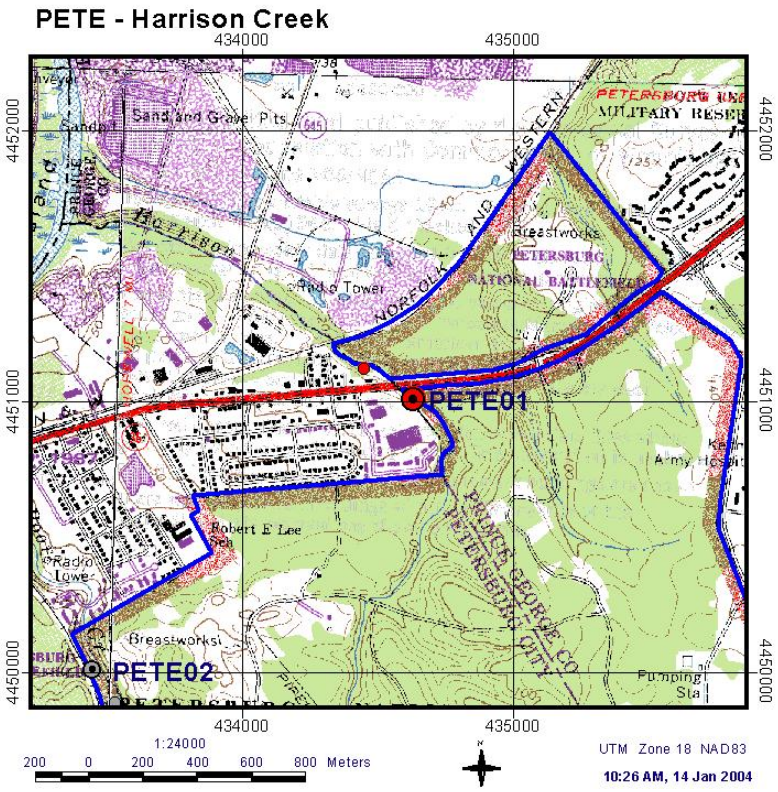
Map 8: Park: Richmond National Battlefield Park



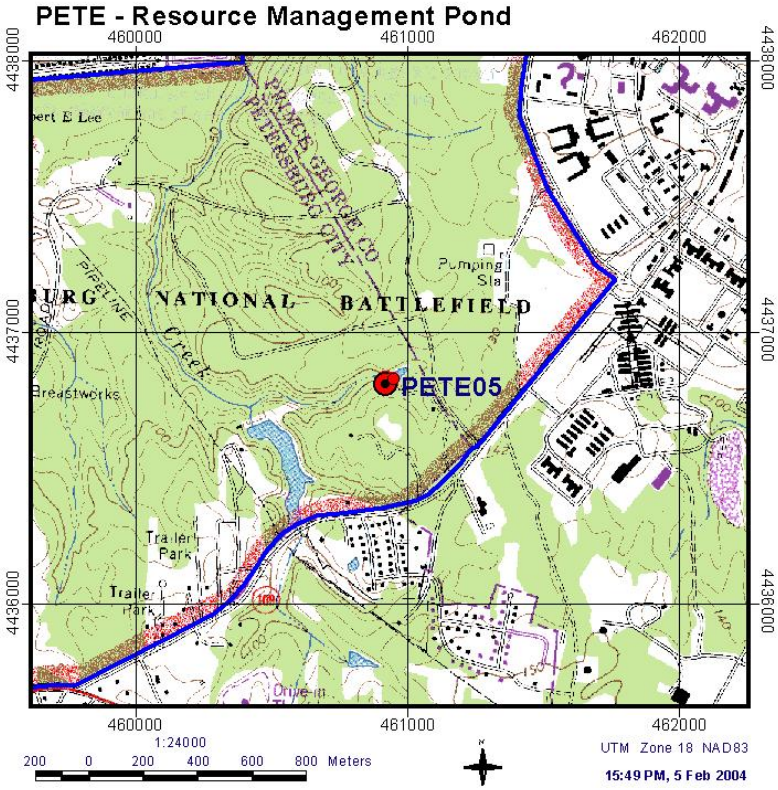
Map 9: Park: Richmond National Battlefield Park



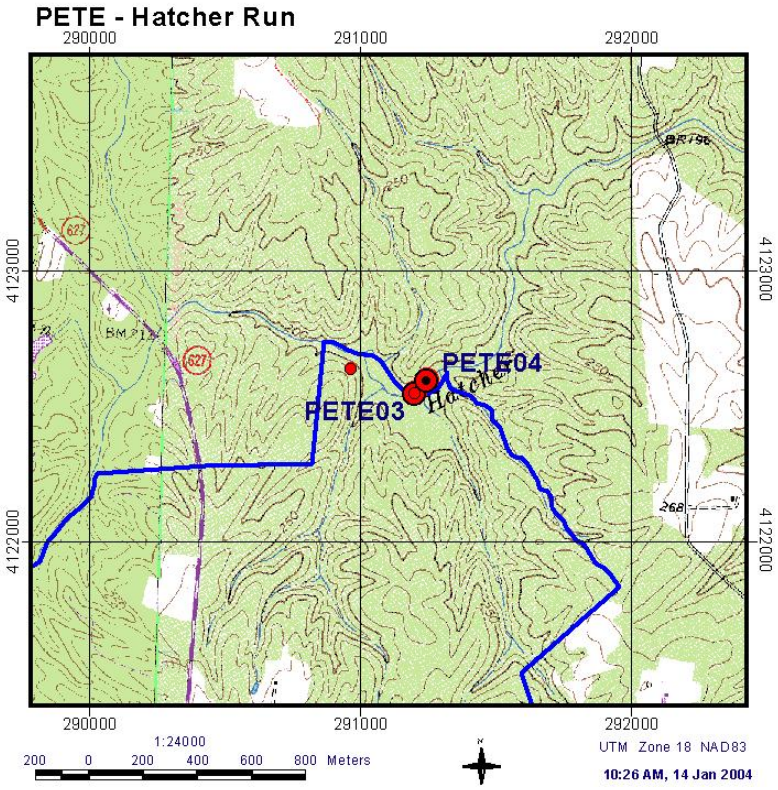
Map 10: Park: Petersburg National Battlefield



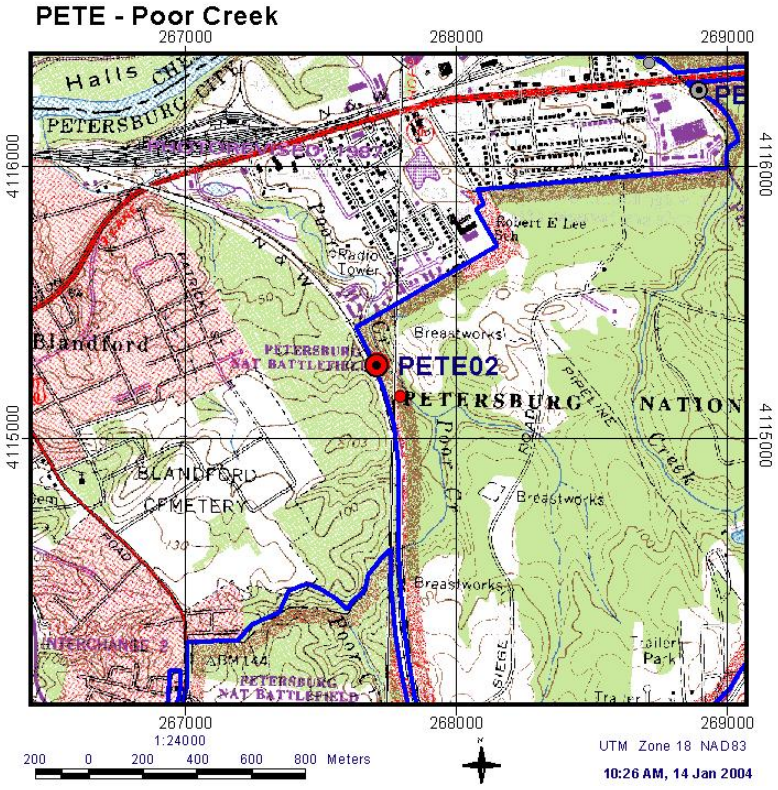
Map 11: Park: Petersburg National Battlefield



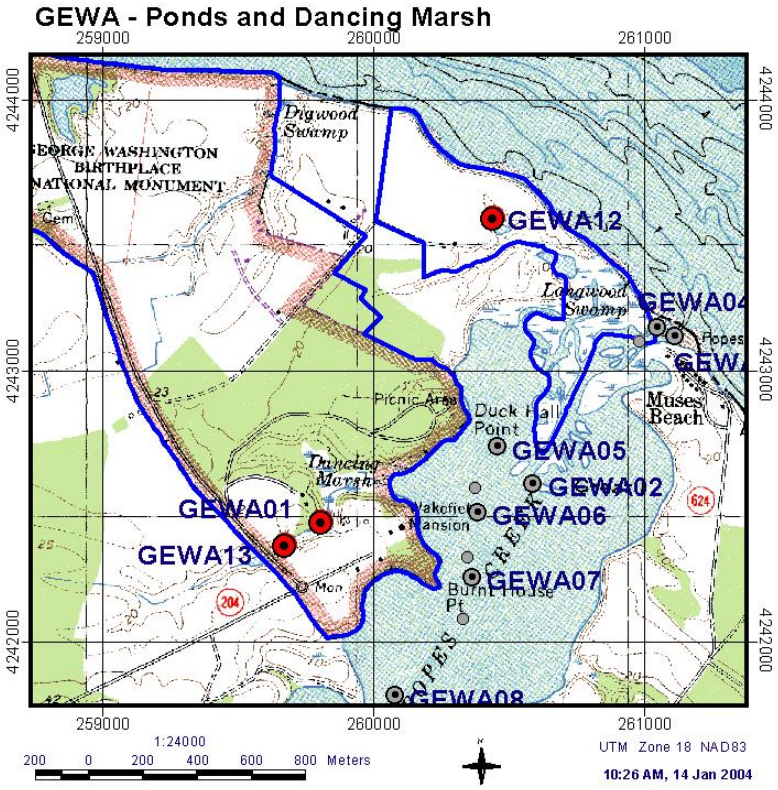
Map 12: Park: Petersburg National Battlefield



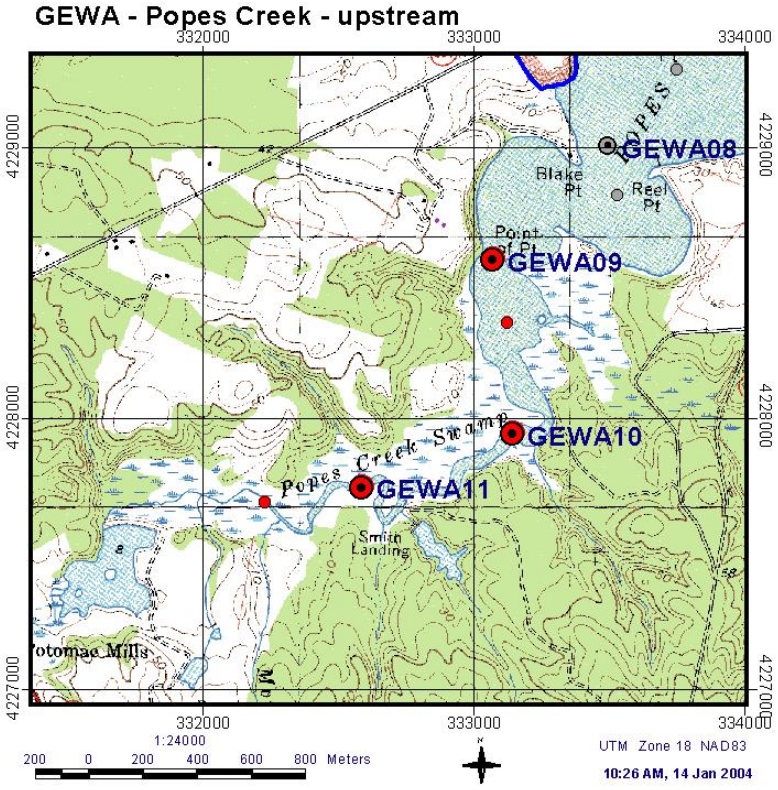
Map 13: Park: Petersburg National Battlefield



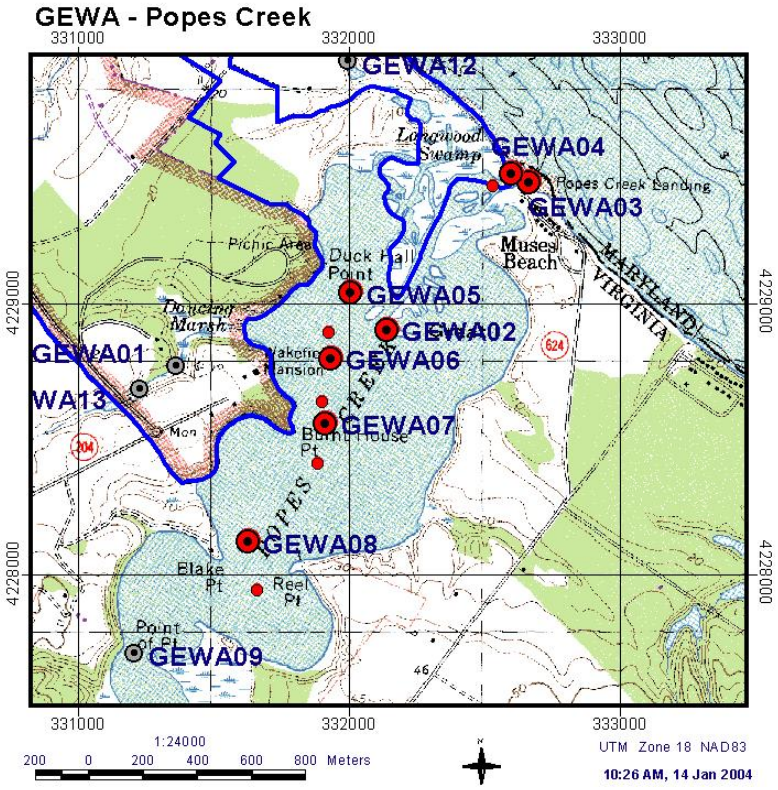
Map 14: Park: George Washington Birthplace National Monument



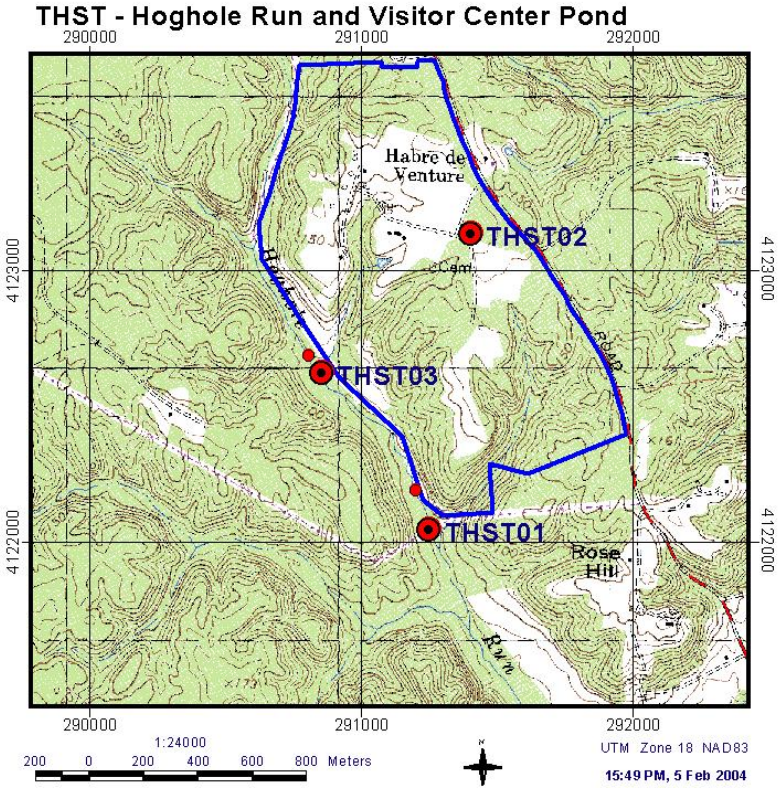
Map 15: Park: George Washington Birthplace National Monument



Map 16: Park: George Washington Birthplace National Monument



Map 17: Park: Thomas Stone National Historic Site



Appendices

Appendix A: List of Fish Species Collected

Date	Species	Number	Stream	Park
20-May-03	White Sucker	3	Wilderness Run	FRSP
20-May-03	RsydaceXCoshnr	1	Wilderness Run	FRSP
29-May-03	Gizzard Shad	1	Beaverdam Creek	RICH
29-May-03	Ironcolor Shiner	2	Beaverdam Creek	RICH
29-May-03	Swamp Darter	1	Beaverdam Creek	RICH
29-May-03	Tessellated Darter	1	Beaverdam Creek	RICH
29-May-03	Least Brook Lamprey	1	Beaverdam Creek	RICH
18-Jun-03	Spotted Bass	1	Beaverdam Creek	RICH
18-Jun-03	Bluehead Chub	5	Beaverdam Creek	RICH
18-Jun-03	Ironcolor Shiner	11	Beaverdam Creek	RICH
18-Jun-03	Swamp Darter	6	Beaverdam Creek	RICH
18-Jun-03	Tessellated Darter	2	Beaverdam Creek	RICH
18-Jun-03	Least Brook Lamprey	11	Beaverdam Creek	RICH
18-Jun-03	Eastern Mosquitofish	2	Beaverdam Creek	RICH
23-Jun-03	American Eel	1	Harrison Creek	PETE
23-Jun-03	Least Brook Lamprey	13	Harrison Creek	PETE
23-Jun-03	Sea Lamprey	1	Harrison Creek	PETE
11-Aug-03	Spotfin Shiner	5	Myers Run	VAFO
11-Aug-03	Spottail Shiner	3	Myers Run	VAFO
11-Aug-03	Bluntnose Minnow	2	Myers Run	VAFO
11-Aug-03	Tessellated Darter	10	Myers Run	VAFO
12-Aug-03	Rock Bass	1	Valley Creek	VAFO
12-Aug-03	Tessellated Darter	20	Valley Creek	VAFO
13-Aug-03	Spottail Shiner	2	Valley Creek	VAFO
13-Aug-03	Bluntnose Minnow	1	Valley Creek	VAFO
13-Aug-03	Fathead Minnow	2	Trout Run	VAFO
18-Aug-03	Banded Killifish	4	Pope’s Creek	GEWA
18-Aug-03	Mummichog	2	Pope’s Creek	GEWA
19-Aug-03	Atlantic Needlefish	1	Pope’s Creek	GEWA
19-Aug-03	Alewife	1	Pope’s Creek	GEWA
19-Aug-03	Common Carp	1	Pope’s Creek	GEWA
19-Aug-03	Bay Anchovy	1	Pope’s Creek	GEWA
19-Aug-03	White Perch	1	Pope’s Creek	GEWA
19-Aug-03	Striped Bass	1	Pope’s Creek	GEWA
19-Aug-03	Yellow Perch	2	Pope’s Creek	GEWA
19-Aug-03	Spot	1	Pope’s Creek	GEWA
19-Aug-03	Hogchoker	3	Pope’s Creek	GEWA

Appendix B: Breakdown of Budget by type of Expenditure

Expenditures	Funding Source	
	Park Base	Mid Atlantic Network
Personnel		
Wildlife/Fisheries Biologist (3.0 pp)	$8,291.00	
Lead Biological Technician (2.0 pp)	$3,630.00	
GS-5 Biol. Tech. (1.0 pp)	$1,060.00	
GS-4 Biol. Tech. (1.5 pp)	$1,422.00	
GS-4 Biol. Tech. (1.0 pp)	$948.00	
GS-4 Biol. Tech. (1.0 pp)	$948.00	
GS-4 Biol. Tech. (1.0 pp)	$948.00	
Travel (Per Diem)		
Crew of 4 (RICH & PETE)		$1,084.00
Crew of 9 (VAFO)		$1,926.00
Crew of 7 (GEWA)		$798.00
Supplies and Equipment		
Alcohol & Specimen Jars		$735.00
Neoprene Waders & Boots		$811.00
Coop Agreement (USFWS)		$2,360.00
Totals	$17,247.00	$7,714.00